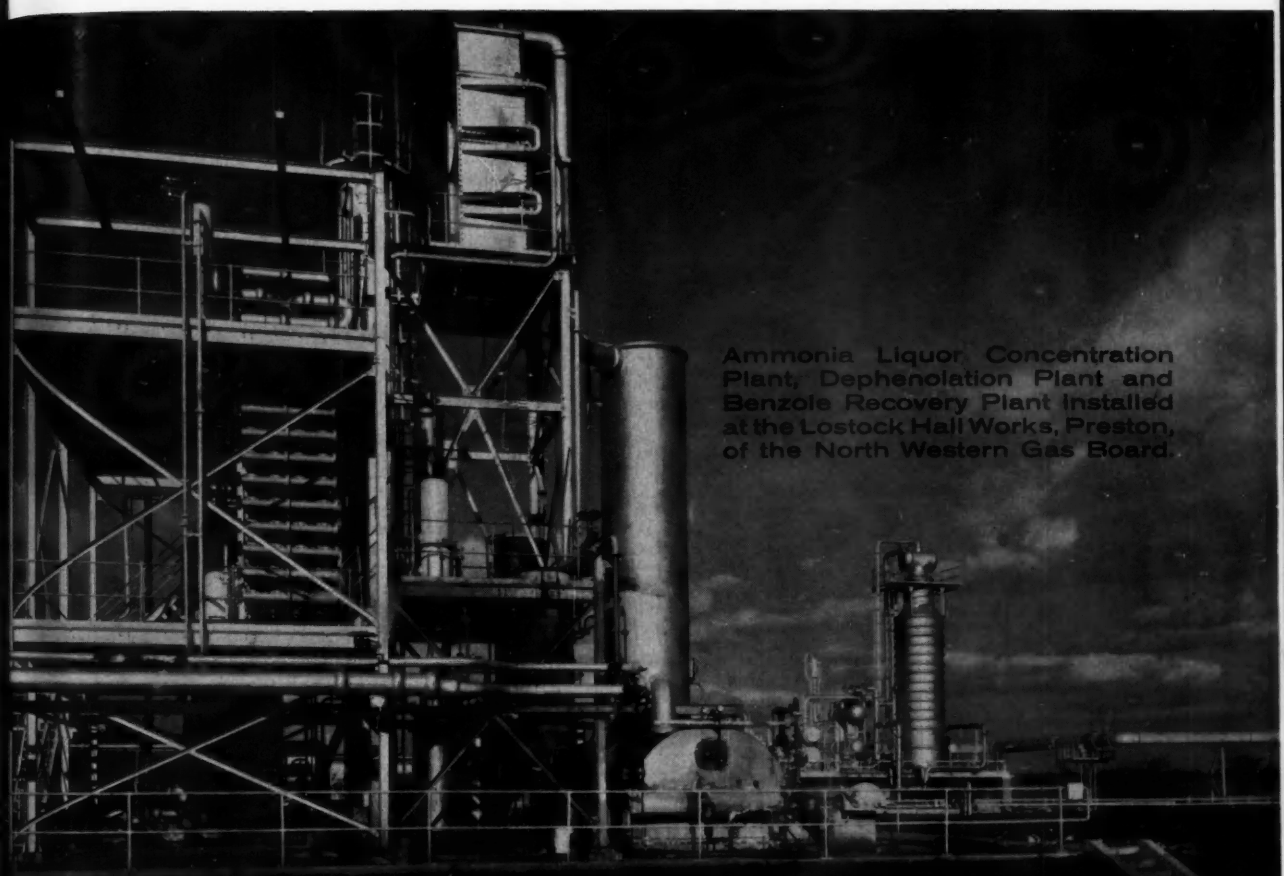
THE UNIVERSITY OF MICHIGAN
ENGINEERING

Gas Journal

VOL. 305 113th YEAR LONDON, JANUARY 25, 1961 No. 5082 PRICE 1/6



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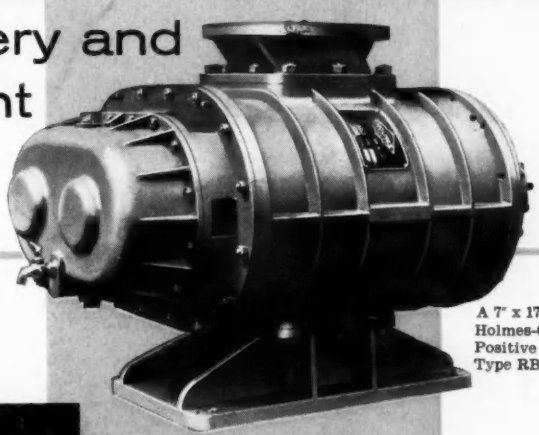

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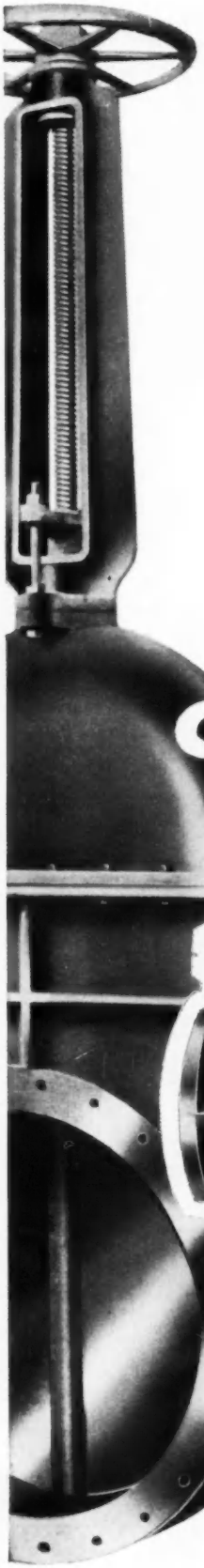

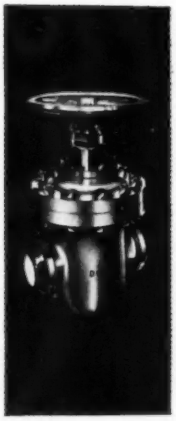

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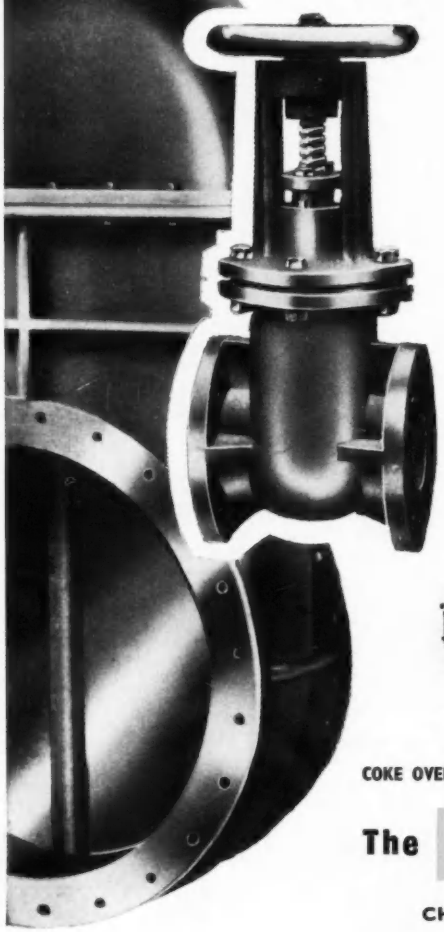
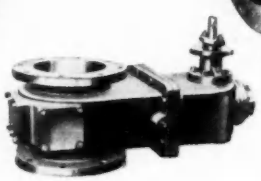


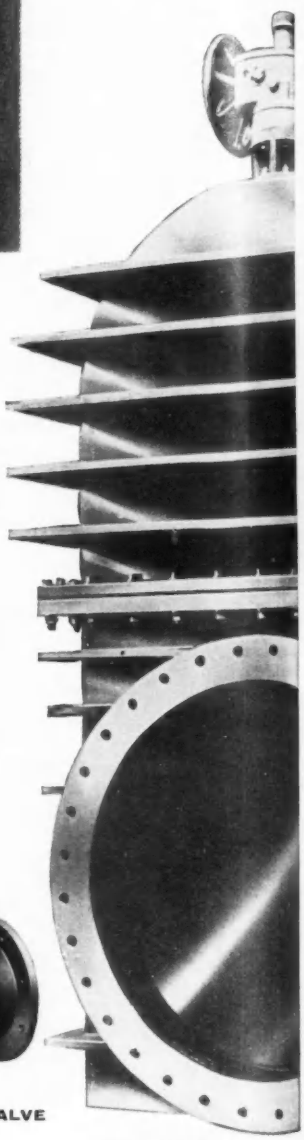
COKE OVEN VALVE

GENERAL SERVICE VALVE

NON-RETURN VALVE



'HICKS' VALVE



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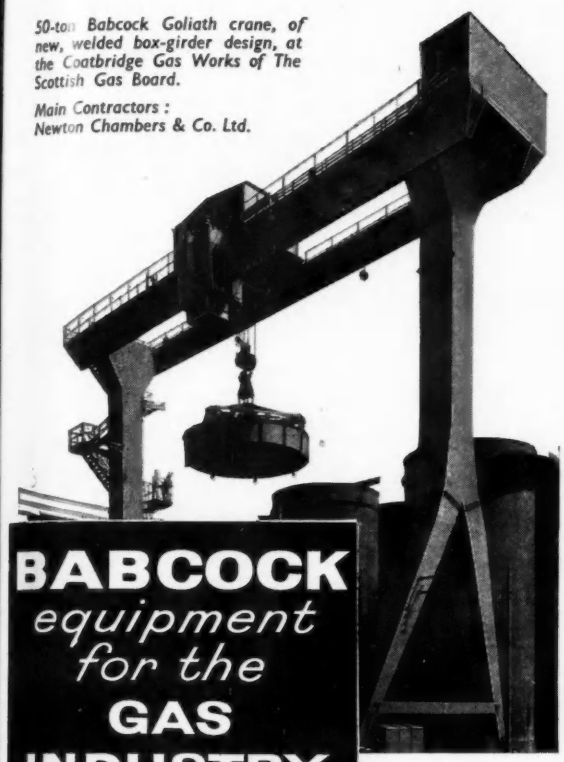

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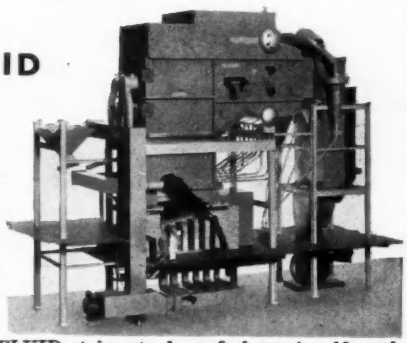

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Gas Journal

VOLUME 305 • NUMBER 5082 • 113th YEAR

WEDNESDAY, JANUARY 25, 1961

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Publishers' Notice See Page 570, December 28, 1960

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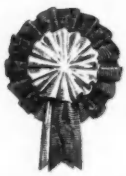

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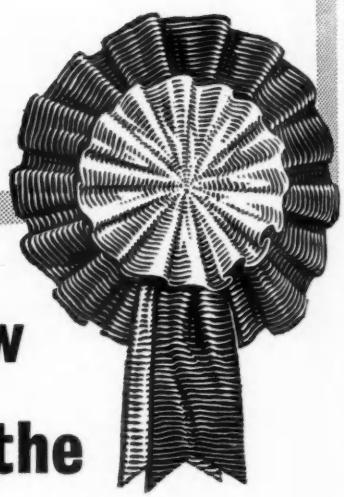

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Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

Heat service or fuel supply?

THE importance of gas utilisation is clear to all, but it may sometimes be taken for granted. There are a great many gas engineers who are interested in gas manufacture and its distribution, but there may be a few who do not take its utilisation as seriously as they should. By utilisation we mean the efficient production of heat in and by the appliance consuming the gas. The importance of this was brought home to us when we listened recently to Mr. L. W. Andrew, Director of the Gas Council's Watson House Centre, presenting his paper 'Gas characteristics as they affect utilisation' to the London and Southern Section of the Institution, a paper which we hope to publish in due course. In it Mr. Andrew had collected and carefully sifted much of the available information on this particular subject and presented gas engineers with an authoritative but simple account of the facts facing the utilisation side of the industry today.

The present problems caused by gases from different sources and made by differing gas-making processes being distributed over wide areas did not become apparent outside the large undertakings until after nationalisation. But even in these undertakings there was clearly a much greater uniformity of gas-making processes then than now, though they might be split up among several gasworks.

Carbonisation and carburetted water gas manufacture were the two processes commonly exploited, there being a preponderance of carburetted water gas in winter to meet peak loads.

In the smaller undertakings each with only one works, supplying gas to a local distribution network, utilisation problems were probably unknown provided gas quality was maintained and reasonable maintenance of appliances was carried out.

The spread of the area grid distribution systems after nationalisation and the need to find less costly gas-making processes changed this peaceful, well-ordered situation over night. From the laboratory work already carried out, the importance of the Wobbe index became paramount, and its maintenance at a steady figure within strictly laid down limits has remained the rock on which the application of all subsequent work on gas utilisation has been built.

The decision of each area board to adopt a G number for the gas distributed in its area, considerably eased the appliance manufacturers' problems of designing new and up-to-date domestic and industrial appliances which would be equally efficient in any part of the country. Thus the universal recognition by the industry of the Wobbe number, rather than the calorific value, as the most important quality of gas being supplied to the consumer went a long way towards establishing the conception of a 'heat service' rather than a 'fuel supply.'

It was with the idea of a heat service that Mr. Andrew successfully strove to make various points which the gas engineer must accept when he is planning the distribution of new gases. It is most important to realise that perhaps the biggest selling point for the refined fuels is their ability to provide this heat service. Our competitors, the oil and electricity industries (especially the former whose product cannot be laid direct to the consumer), are always stressing this particular advantage. Electricity may have the additional advantage of always being of the same 'quality' providing the voltage is maintained, but oil and gas can differ in this particular respect. The oil industry takes considerable pains to supply a standardised product, knowing perfectly well the consequence of failing to do so. The gas industry too must make quite certain of being able to exploit its own particular advantages by doing the same.

Work on gas utilisation characteristics has not been confined to this country. A good deal of work has been carried out on the Continent, especially in France. In America, too, its importance has been recognised, but we feel the problems which have faced the American gas industry during and since the war have been rather different from those experienced in Europe. The vast resources of natural gas available in the United States and Canada have enabled these countries to change over completely from manufactured gas to a high calorific value gas of constant quality. Appliance

burners could be changed with confidence.

In Europe, however, other sources of gas, including natural gas, have had to be super-imposed on existing gas supplies from conventional plants. Though gases of high calorific values might be reformed, great care in adjusting their combustion characteristics was needed; similarly consideration is needed when modifying conventional town gas to render it non-toxic. The water gas shift reaction will increase the content of hydrogen and carbon dioxide. Should the latter, an inert, be washed out or should the gas be upgraded by blending with l.p. gases? The answer to this question is mainly one of economics, since the absorption of very large quantities of carbon dioxide by chemical reagents is expensive, while its commercial value is small. Blending with gases of high calorific value is therefore a solution. Should methane or l.p. gases be used? The combustion characteristic diagrams which have been worked out by a number of workers in this particular field can be used to provide the answers.

By the use of the standard equipment available, standard gases can be compared with actual gases being made by the industry, and these in turn compared with gases made up synthetically to have similar characteristics. This work will not only show the suitability of possible gases produced from new processes, but will also demonstrate the practicability of changing the burners or radically readjusting existing burners in any supply district. Some gases may be interchangeable with the town gas at present being distributed, while other gases may demand considerable modification to the appliance.

How can this be done while still maintaining the 'heat service' to the consumer? This is one of the many 'tricks' that the gas utilisation technologist has up his sleeve. He might well have to make full use of them if and when a national grid becomes a reality.

The distribution of a uniform gas throughout the country from many different sources made by several processes from differing raw materials may well be one of the biggest problems facing the national grid controller of the future.

Gaz de France

WE have already reported the main figures of the statistics for the year 1959 issued by Gaz de France some two months ago. These statistics are now issued in full detail in a magnificently designed volume of 240 pages (about 10½ in. by 8 in.) in which full use is made of colour. In this issue the statistics are analysed on the basis first of gas production groups and then on that of the 18 regional centres of distribution. The unit is the *thermie;* it is explained in a footnote for the benefit of English-speaking readers that 25.2 thermies (or 25,200 kcal) correspond to 100,000 British thermal units, i.e.: 1 therm, and that 1 thermie is equal to 3,968 B.t.u. or 0.03968 (say .04) therms.

Gaz de France supplied to its customers, 15,738 mill. thermies (say 629 mill. therms) 298 mill. thermies more than in 1958. This gross advance of 1.9% is the lowest observed since 1953, a year characterised like 1958 by a slight recession in industrial production in the principal countries of Europe and the U.S.A.

The relatively high atmospheric temperature of 1959 also caused a reduction in the demand for space heating. As we have before reported, it is estimated that if corrections are made for the abnormal weather conditions there would have been an increase of 3.2% in gas sent out and 3.7% in actual sales. These figures are to be compared with the average annual increment of 4.4% between 1947 and 1959 in the sales of gas by Gaz de France.

It should be noted that the latest figures in the December issue of the French *Journal* show that in October, 1960, output increased by 12.2% over that in the corresponding period of 1959.

The figures are then analysed in the several sections of the market—domestic, commercial and industrial. In spite of the unfavourable climatic conditions, the domestic clientèle, representing about 60.5% of total sales, purchased 9,514 mill. thermies in 1959 against 9,405 in 1958 an increase of 109 mill., much lower than the 639 mill. which was the increase of 1958 over 1957. But while the average annual growth of demand in this field over the period 1947-1959, was slightly less than 3%, for the more recent period 1955-1959, the rate of annual increase has been 5.3% in spite of the exceptional temperature of 1959. This year of 1955 marks the introduction of two-part tariffs which have been generally very popular.

In the commercial field advance, though still definite, also shows a tendency to slow down, but here again the success of the two-part tariff promises well for the future. At the end of 1959 nearly 21% of commercial clients (against 10.7% at the end of 1958) had applied for these tariffs. They represented 42.5% of sales against 29.2% of the preceding year.

The demand for gas in the industrial field continues to grow more rapidly than that in other fields. And this in spite of the somewhat complicated financial adjustment arising out of the exploitation of natural gas. For instance, an important client taking more than 50 mill. thermies per annum was transferred to the Cie. Française du Methane. The annual rate of increase was 9.7% over the period 1947-1959 against 10.3% for the period 1947-58. It remains double the figure for the overall sales of gas. Analysis shows encouraging growth of sales in many branches of industry. But this remains a sector closely affected by economic difficulty encountered by a wide variety of clients.

This imposing volume proceeds to an intensive survey of the methods of production and the markets for coke and other by-products and then to the detailed operations of the 18 different regions of distribution with beautifully drawn maps and graphs, a vast body of information.

From a paper to the Western Junior Gas Association, Bath.

A storage tank for primary flash distillate

By C. E. M. STEPHENS, A.M.INST.GAS E.,
ASSISTANT WORKS ENGINEER AND MANAGER (PRODUCTION),
STAPLETON ROAD WORKS, BRISTOL,
SOUTH WESTERN GAS BOARD.

IT is the present policy of the South Western Gas Board to use primary flash distillate for the production of peak load gaseous therms by injecting this hydrocarbon oil into carburetted water gas plants, intermittent vertical retorts and continuous vertical retorts, and in order to store sufficient quantities of this distillate at the Stapleton Road works, for use on continuous vertical retorts, a 200,000-gal. capacity storage tank was constructed.

In selecting the site for the storage tank it was desirable to have the tank near to a gasholder inlet main into which the volatile vapours of p.f.d. from the 'free space' of the tank could be allowed to breathe.

The choice of a tank falls between the use of either a vertical or horizontal tank. In this particular case, the size of the tank required made a vertical tank necessary. From all points of view, the most economical shape for a vertical tank is tall and narrow but there are practical limitations to the heights to which vertical tanks can be built; this maximum height is about 60 ft. and is dependent upon the diameter and on the bearing capacity of the foundations.

Vertical tank

The final selection for the type of tank to be constructed was based on the decision to allow the volatile products of the p.f.d. to breathe freely into the inlet gas main to the 6 mill. cu.ft. capacity gasholder. Since the storage tank under these conditions would be subjected to a maximum pressure of 15 in. w.g. a vertical tank of high pressure fixed roof design was chosen.

A subsoil investigation revealed that the maximum safe bearing at the surface was less than .1 tons per sq.ft. Borehole trials established the presence of a formation of trias at a depth of approximately 20 ft. with a superimposed fill of spent lime. It is recommended that should the ground bearing capacity be less than .75 tons per sq.ft., either a deep foundation slab or piling is necessary.

Calculations of the actual load to be carried showed that this bearing load would be exceeded, so accordingly the foundation area was piled with 24 12-in. square pre-cast piles to a depth varying between 20 ft. and 25 ft. A concrete slab suitably reinforced with steel beam construction was cast integral with the pile caps, and was cambered from 12 in. thick at the centre to 9 in. thick at the periphery.

After allowing time for the concrete slab to 'set off' a 2 in. thick uniform layer of bitumen sand was rolled over the top of the foundation slab in readiness to receive the tank bottom plates.

The tank floor plates were first laid on the prepared foundation starting at the centre and working out to the edge of the slab. Each floor plate had an overlap of 2 in. To overcome the ridge so formed, the floor plates were 'joggled' at the periphery by heating at the junction, and hammering. At each of these junctions a weld was made 6 in. in length from the outside edge of the floor plates, and was tested by the 'vacuum box' method described later.

The erection of the tier plates was then commenced, each course being separated on the horizontal seams by using shims and wedges.

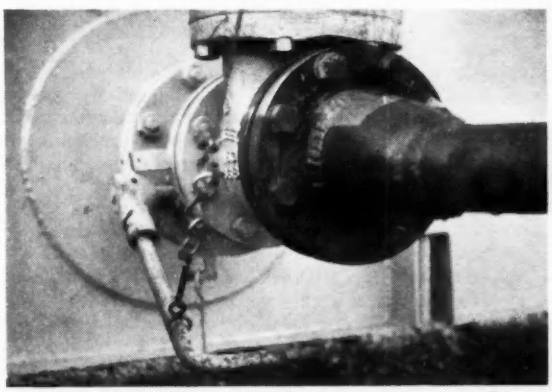
The ¼-in. shims ensure the horizontal seams having an even gap for the subsequent welding, while the wedges are driven into the slot in the shim on each side of the tier plates to keep them in line.

Gates and drift pins which span the various joints help to stiffen the tank during the building up, and by varying the position of the drifts the welding gaps can be opened or closed as required.

When all the tier plates had been erected the curb angle was then welded to the top of the top stake thus stiffening the tank and giving a seating for the roof plates. The roof structure was then assembled.

The tank plates have been welded by the 'stovepipe' technique, in which the weld is laid by starting at the top of the plate joint and working vertically downwards. This allows greater speed but there is less weld deposit, since the weld metal has to be fairly quick-freezing. The design and

Fusible link on internal safety valve fitted to tank outlet connection.



composition of the electrode, however, causes the weld metal to be pushed deeper into the plate; so much so, that it penetrates through to the back of the plate, *i.e.*, the inside surface of the tank tier plates. Horizontal seams are welded in the same manner.

To avoid extreme stress and cracking of the weld, and to overcome any extreme cooling, more weld metal has to be deposited while the first run is still hot. This further metal is added by the second run known as the 'hot pass.' At the completion of the 'hot pass' run there is sufficient metal to counteract any stress caused by contraction.

A further capping run is required to finish the weld on the outside of the tank, and a final run put on from the inside of the tank to seal the weld root.

To keep a tight check on the individual welds X-ray photographs were taken during the erection of the storage tank, by using a small portable 140 kV set capable of X-raying steel plate up to ¾ in. thick. The taking of radiographs is a simple matter and can be carried out by unskilled labour providing the person selected is well briefed in the dangers of X-rays to the human body. The interpretation, however, of the radiograph is a different proposition and much skill and experience is required to evaluate the markings that are shown.

The usual acceptance standard of a radiograph is 2% sensitivity, in other words any defect 2% of the plate thickness, or greater, will show up on the radiograph; for example on 1-in. thick plate the figure 2 on the penetrameter used for the purpose would be just about visible.

The 'vacuum box,' used for tank testing consists of a box approximately 2 ft. long, 6 in. wide and 6 in. deep with an open bottom and a glass top. Fitted to the bottom is 2-in. thick sponge rubber which ensures a seal between the floor plates and the box body. A tube extending into the inside of the box is fitted with a vacuum gauge and exhaust valve, and is connected to an external vacuum pump.

To test the welds on the floor plates, they are first coated with a soap solution, the vacuum box placed over the weld and the pressure in the box reduced to a vacuum of 10 in. to 15 in. mercury. Should there be any leak, air will be drawn through the weld from under the floor plates and bubbles will be observed through the glass top. No leaks were detected on the tank bottom.

A water test carried out by filling the tank to a height of 2 in. above the top curb angle showed that all the barrel joints were sound. The roof plating was then tested by the application of an internal air pressure of 20 in. w.g. and sustained. No leaks could be detected by using soap solution, so here again all welds were found to be sound.

Surveyor present

A surveyor of the Board's insurance company was present at the welding operator test on site, and witnessed the bend and nick break tests in the shops and the vacuum box test. He also carried out a radiographic inspection of plates, after choosing the joints by visual inspection; he also witnessed the water and air tests on completion.

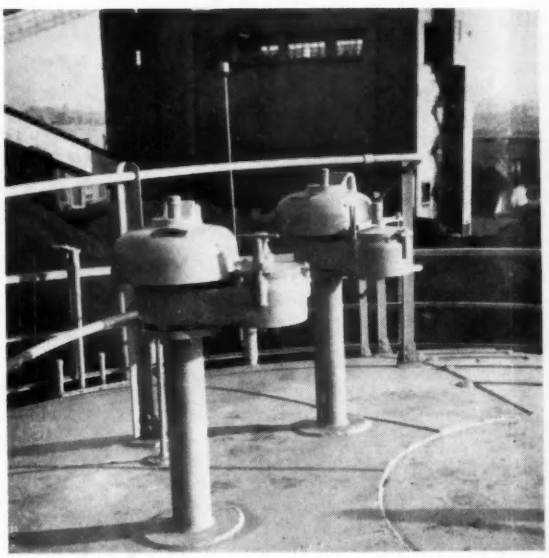
Any petroleum flash point of which is below 73°F. has to be stored and conveyed in accordance with the regulations laid down by the Petroleum Acts of 1928 and 1936; p.f.d. falls within this category.

In spite of a code of practice laid down by the Home Office for guidance in the safe construction of storage tanks for petroleum, the local Fire Authority has the right to interpret its own requirements for any such installation. There must therefore, be close consultation with the local Petroleum Officer during the planning stages, since the final licence for the storage of petroleum is issued by him, and depends entirely on his satisfaction that all the requirements of the Local Authority have been complied with.

The bund area for the storage tank must be of sufficient capacity to contain the full contents of the tank —200,000 gal.—plus 10%.

At Stapleton Road works the bund perimeter is 300 ft. square, surrounded by 4 ft. walls with an earthwork embankment covered with a 3-in. thick concrete layer, at an angle of 45° formed inside the wall. A valve is fitted to the drain pipe outside the bund area and is connected to an interceptor chamber before joining up to the corporation drains. This interceptor is designed to prevent any p.f.d. from passing forward into these drains.

Top of tank, showing 4-in. Shand and Jurs pressure/vacuum breather valves.



Providing a clear space of 8 ft. from the bund wall, a 6-ft. high chain link security fence is supported on cranked concrete posts, through gates in which road tank vehicles enter the unloading area; two emergency gates are also provided in the fence structure, one gate opposite each foam inlet pipe. Free access must be left to these gates at all times. A 6-in. bore pipeline from the roof connects the tank to the gas main and so ensures an entirely gaseous atmosphere in the free space of the tank at all times. In the event of the tank catching fire a fusible link is designed to fail at a temperature of 155°F.; this will cause a wire cable to slip and allow a safety butterfly valve on the roof of the tank to shut, which isolates the gas main from the free space in the tank roof.

Two 4-in. Shand and Jurs pressure/vacuum breather valves installed in the tank crown and set to open at 20 in. pressure and 2½ in. vacuum, protect the tank and its roof from bursting, or collapsing internally.

Should the need ever arise to vent the tank through these weather valves, the town gas contained in the vent pipeline would be suitably purged with inert gas.

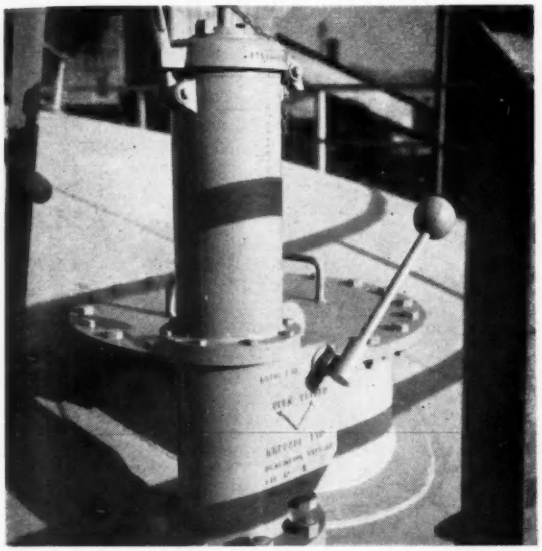
A Shand and Jurs automatic tank gauge enables a quick and reasonably accurate reading of the contents of the tank to be taken. A stainless steel float inside the tank is fitted to a tape passing through a seal tube to the outside of the tank. A Tensator spring motor balances the

stainless steel float inside the tank against the amount of tape run out allowing a direct reading to be taken off the tape through a small window in the transmitter body.

For more accurate measurements, however, a hand dip of the tank contents must be taken daily, and this is accomplished with complete safety by using a Whessoe slot dipping device. This consists of an aluminium standpipe fixed to the tank roof and fitted with a flap valve. It is provided with a hinged cover over an opening in the top normally closed by a removable plug clipped in place by a bayonet fitting. The cover and flap valve are made vapour-tight by 'O' ring seals.

To take a measurement the person dipping removes the upper plug and inserts the 'plumb-bob' through the hole, clipping the tape adaptor in position in the hole, using the bayonet fitting. The lower flap valve is opened and a dip measurement taken in the usual way. After an accurate dip reading is obtained the 'bob' is hoisted to a position above the flap valve which is then closed. The tape adaptor is removed together with the tape and 'bob,' and the bayonet fitting plug immediately replaced.

Whessoe slot dipping device on tank top.



A requirement of the local Fire Authority is to incorporate in the tank, foam pourers which will apply an adequate supply of foam to the surface of the tank contents in the event of a fire. Two such installations were fitted to the Stapleton Road storage tank just below the top curb level, and are placed 180° apart.

The Fire Authority has laid down that no naked lights must be within 50 ft. of the installation, and this also applies to steam locomotives which can, from time to time, emit sparks.

The electric motors and starters, push buttons, lighting and control equipment associated with the p.f.d. unloading and process pumps must be of the flameproof type certified for use in at least Group 2 gases.

No overhead cables or telephone wires are allowed to cross any part of the bund, or unloading areas, and adequate measures must be taken to earth all electrical equipment within the compound, larger items preferably being fitted with earth leakage protection. Static electricity is generated by p.f.d. when passing through pipes at a velocity in excess of 3 ft. per second. Static electricity can also be produced from 'free falling' p.f.d. so that any inlet or return pipes must be taken to the bottom of the tank.

Duty must be paid upon all hydrocarbon oils used in warehouses or factories which are not approved as refineries. The Commissioners of Customs and Excise, however, are prepared to approve such refineries for the treatment of hydrocarbon oils and an allowance equal to the duty is granted on such hydrocarbon oils that are used for conversion into products other than hydrocarbon oils, *e.g.*, for the production of gas. By virtue of its derivation, and use, p.f.d. falls within this category.

DISCUSSION

Mr. Cameron, Bristol, asked whether Mr. Stephens could give any indication of the loss of p.f.d. which would take place due to evaporation if the tank was not vented to the inlet gasholder main.

Mr. Stephens referred to a paper on this subject, giving details of tests on various tanks, from which it appeared that losses could vary from 0 to 1%. One particular example quoted a .2% loss during the course of a year, which, taking a throughput of 1 mill. gal. per annum, represented at cash loss of approximately £75 per annum. This loss was prevented by venting the tank to a gas main, but there was still, however, a slight loss of coal gas due to leakage from the Shand and Jurs pressure/vacuum breather valves.

Mr. New, Plymouth, asked what method of welding was used on the tank bottom plates; he understood that there was some divergence of views on the best techniques to be adopted. Experience at Plymouth had indicated that neoprene diaphragms were unsuitable for use with p.f.d. in the Shand and Jurs breather valves. The dipping arrangements on the Bristol tank seemed to be very good and represented an improvement on previous practice. With regard to the drainage of the bund area, he asked whether an interceptor pit was fitted, and commented on the considerable variations in petroleum officers' requirements in interpreting the regulations.

Mr. Stephens confirmed that one interceptor pit was installed, with a 6-in. pipe passing through the bund wall. The slot dipping device was extremely useful and pointed out that manufacturers were constantly improving this type of equipment, in fact the type of tank gauge fitted at Stapleton Road was already obsolete. The bottom tank welding was of the conventional type using the back step technique.

Mr. G. Edmunds, Powell Duffryn Engineering Co. Ltd., confirmed that back step welding had been used, since this method minimised any buckling effect on the plates. The short seams across the plates had been welded first, followed by the long seams.

Mr. D. H. P. Hammond, Weston-Super-Mare, asked for further information on the welding techniques. In view of the heat losses which would obviously occur what was the time lag between finishing the root run and applying the hot pass? He was a little surprised to see that the tank was bedded on a sand/bitumen mixture, since in the event of any future leakage from the tank the bitumen would rapidly dissolve and this would have a deleterious effect on the installation.

Mr. Stephens and **Mr. Edmunds** went into further details on the welding technique used, and pointed out that stovepipe welding was considerably faster than normal welding; in fact the hot pass was applied before any appreciable cooling took place. **Mr. Stephens** explained that the object of the sand/bitumen mixture was to enable the tank floor plates to be bedded in evenly to prevent the setting up of any unnecessary stresses; this was the accepted practice in the oil industry.

Mr. H. Hobbs, Wm. Press & Son Ltd., took up Mr. New's point regarding different ways of interpreting the petroleum regulations in different areas. His firm had carried out a petroleum installation in conjunction with another contractor, within the L.C.C. area, and the latter authority had insisted that it should be below ground. The use of a bitumen/sand screed was quite normal for tank bases of this type, but he pointed out that there was a divergence of views on the construction of bunds, the Institute of Petroleum recommended a capacity of one tank volume + 10%, whereas the L.C.C. required something approaching 100% capacity. He also asked whether consideration had been given to the installation of a water spray, and whether the author had any idea of the quantity of water required for spray purposes.

Mr. Stephens replied that the fire authority had the last word on fire fighting requirements, and in this instance had stipulated that a foam pourer should be installed; the Bristol authority, he understood, disliked underground storage installations. He had no experience of the installation of water sprays.

Mr. W. E. Baggs, Bath, speaking as an accountant 'with little technical knowledge,' said that with so many people and regulations to satisfy it was quite an achievement to have satisfied anyone at all. He was interested to know that the tank was vented into the gas stream and wondered what loss of p.f.d. occurred from the tank into the holder. Since p.f.d. was so volatile, how did anyone ensure that deliveries were of the correct quality?

Mr. Stephens pointed out that the purpose of venting to the gas stream was to prevent actual loss of p.f.d., and to provide an all gaseous atmosphere in the tank above the liquid. Referring to the measurement of deliveries, normally these were made by 4,000-gal. capacity tankers with five compartments, each of which was dipped before pumping started.

Mr. J. B. Taylor, Bath, was particularly interested in the safety precautions which were an essential feature of such an installation. In venting the tank to a gas main, he asked whether consideration had been given to the admittedly unlikely possibility of vacum conditions obtaining in the gas main. He stressed the importance of a code of practice for safety precautions on p.f.d. installations, and the necessity of operating the permit to work system.

Mr. Stephens replied that the tank was vented to the inlet holder main and the possibility of negative pressure conditions was very remote. The permit to work system was well established, and was the only way of enforcing safety regulations.

New Standard for installation of gas appliances

HOUSING authorities, builders, architects, gas engineers and plumbers will welcome the revised British Standard Code of Practice for the installation of gas appliances for laundering and ancillary domestic purposes (CP. 332.601 : 1960). Prepared by a Committee convened by the Institution of Gas Engineers, it contains expert guidance on the provision, siting and installation of miscellaneous gas appliances ranging from a gas poker to a washing machine. The code takes into account developments in installation technique since 1947, when the former edition was published, and stresses the importance of consulting the gas undertaking at the early planning stage.

Included in the code are the relevant recommendations contained in 'Regulations governing the installation of gas service pipes and gas appliances,' published by the Institution of Gas Engineers in 1937. The code may, therefore, be regarded as replacing former regulations in so far as they relate to gas-heated appliances for laundering and ancillary domestic purposes.

The contents of this publication include: Advice on ventilation of communal drying rooms; guidance on the use of gas controls to ensure that cabinets and drying rooms do not become overheated and cause damage to clothes; methods of disposing of steam and water vapour from flueless appliances in kitchens and bathrooms; guidance on the use of flexible tubes and connectors for portable appliances; and reference to the use of socket outlets to British Standard requirements.

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 6s. (Postage will be charged extra to non-subscribers.)

BOILER HOUSE PRACTICE (Third Edition) By J. N. Williams.

THE third edition of this book which makes its appearance within less than four years of the publication of the second edition, continues to supply the background information to all those concerned in boiler house management, fuel economy in steam raising and the choice of fuels for burning under boilers.

As in previous editions, a great deal of information on the testing, handling and analysis of fuels is included, covering also the use of coke and breeze as well as pulverised fuel.

The importance of chimney emissions has grown since the passing of the Clean Air Act, and means of reducing these including a reference to smoke density, is treated with this in mind.

The increased length of the new edition from 624 pages to 648, including appendices and the index, gives some idea of the rate at which new information is appearing, and also the severity of the task to be faced by the author when a revision is contemplated.

GEORGE ALLEN & UNWIN LTD., PRICE 70s.

Physical Society Exhibition

THE 1961 exhibition of the Physical Society held recently in the Royal Horticultural Society halls at Westminster was the 45th of the series, but the first since the Society's amalgamation with the Institute of Physics last year.

It was held a month earlier than has been customary in the past, a point appreciated by the scientific instrument manufacturers who feel that a January exhibition enables them to show all their newest appliances before they appear at commercial exhibitions during the course of the year.

In this way the scientific worker can get a better idea of what is becoming available to assist him in his laboratory work, while at the same time the technologist can explore the advances of instrumentation and other aids, some based on completely new principles, in a more leisurely and relaxed atmosphere in consultation with perhaps the designer himself. At the commercial exhibition, sales being the more immediate object, an opportunity to inspect prototypes is less likely, so also is the presence of the research worker behind the stand.

New apparatus

As in previous years, almost without exception all the apparatus on show was new, and had not been previously exhibited at the Society's show. Where the object of the exhibitor was to put forward certain techniques, for instance of communication, commonly practiced in the past but now to be based on modified or entirely new principles, familiar apparatus might have appeared on certain stands, but largely as a 'hook-up' before undergoing its development by the firm's design department into neat, streamlined commercial units, readily adaptable to some specific purpose.

Out of the multiplicity of instruments on show capable of measuring an ever increasing number of physical quantities more accurately, continuously and by some electric or electronic means, it is difficult to pick out any of specific interest to the gas industry, though there were clearly many that would find a place in the industry's research laboratories, and the central laboratories of individual boards. The new filament type of paramagnetic oxygen detector, exhibited by the Cambridge Instrument Co. Ltd., was a good example of this.

Of interest, too, was a pressure transducer, designed to convert very small pressures into electrical signals which, after suitable amplification, will operate quick-response galvanometer recorders. It consists of two very small stiff diaphragms connected at their centres by a bar carrying the moving member of the Cambridge screening micrometer. When used with a transistorised oscillator-amplifier and a Cambridge three-channel direct-writing recorder or four-channel photographic recorder, the transducer provides pressure ranges from 0-20 mm. Hg. to 0-300 mm. Hg. Since the diaphragm moves only one millionth of an inch for 1 mm. Hg. the volume changes for full scale deflection are correspondingly small, enabling a high-frequency response to be obtained from the complete system. The transducer is suitable for both gauge and differential pressure measurements.

A prototype of a multi-point boiler feed-water analyser capable of recording continuously on one chart the results of up to 12 different analyses made on boiler feed-water was also on view. This model records the concentration of dissolved oxygen and hydrogen between 0 and .010 mg. per litre.—max. 0 to .4 mg. per litre—conductivity, 0-10 micromhos, and *p*H between 4 and 14. Elements for measuring other characteristics of feed-water are being developed.

The Cambridge pocket *p*H meter now in production, makes isolated *p*H measurements a simple, three-minute operation and gives consistently accurate readings where a variety of processes must be constantly checked. Powered by a dry cell with a life of approximately 1,000 hours the instrument has a direct-reading scale covering the whole *p*H range from 0 to 14 units, within an accuracy of ±.1 *p*H. The measuring and reference electrodes have been combined into a single concentric unit which is sheathed in protective plastic and has a plastic cup to hold either the standardising buffer or the sample to be tested.

The 'digital bricks' exhibited by Nash & Thompson Ltd. represent a new range of logical units to enable complete equipment of feasibility circuits to be built direct from a schematic diagram. Also available in brickette form or as brick units in a kit these units are most suitable for education or training purposes. The range includes AND gates, OR gates, inverters, delays, Eccles-Jordon circuits, and power packs. The units are designed for d.c. or pulse drive.

The Nashton closed circuit television camera also demonstrated, is simple to operate and the installation can easily be carried out by the user. No special control unit is required, all the power supplies being in the camera which is only 13½ in. by 7¼ in. by 7¼ in.; a standard commercial 405 line television receiver is used as the monitor.

For optical work

Spectrosil, manufactured by The Thermal Syndicate Ltd., is a synthetic fused silica now used in increasing quantities not only in apparatus where extreme purity is required but as an ideal material for optical work at high temperatures and in the ultra-violet spectrum. Of the two grades now manufactured Spectrosil B is a good general optical material, and is recommended for general work in the ultra-violet region and for ultrasonic delay lines. Spectrosil A is similar but is manufactured against a strict specification for transmission characteristics, permissible refractive index variation and presence of bubbles.

Among the exhibits on the stand of the Department of

Scientific and Industrial Research, the National Engineering Laboratory of East Kilbride, were demonstrating a photographic technique used in conjunction with a circular dividing engine to eliminate short-term periodic errors, and enable precision radial scales to be produced in a few hours instead of the days required for conventional ruling. The use of radial scales in a moiré fringe error correcting system were demonstrated on a circular dividing table incorporating a worm and worm-wheel drive. The errors in transmission of uniform motion are reduced by a factor of 20.

Here also was to be seen a model of a frictionless propeller meter designed for flow measurement to convert fluid velocity into a rotational speed which can be measured easily. The new meter developed by the national engineering laboratory has the propeller mounted in a hydrostatic bearing and only the resulting viscous friction has to be overcome. An electromagnetic pick-up is built into the bearing to record the rotational velocity of the meter. Tests are in progress to determine the best blade shape and the principle will be extended to propeller meters for measuring point velocities in large pipes.

Superseding metals

The British Ceramic Research Association is now producing three of the new high temperature ceramics to supersede metals and traditional ceramics on a pilot-plant scale. These are boron nitride, a low-friction, machinable electrical insulator, silicon nitride, a strong, chemically inert material maintaining close dimensional tolerances, and dense, self-bonded silicon carbide, a material of high strength and erosion resistance at very high temperatures. Methods of production, structure and properties were demonstrated, and components were shown, while data sheets were also available. Other non-traditional ceramics *e.g.* aluminium nitride, boron phosphide, were also exhibited.

The Warren Spring Laboratory showed a radioactive rotameter for recording low rates of fluid flow at high pressures, or for opaque liquids, where conventional methods of detecting the position of a rotameter float cannot be used. The position of a radioactive float used in either a glass or metal tube can be detected by a number of Geiger tubes mounted in a large metal housing surrounding a portion of the length of the tube.

Among the National Physical Laboratory's exhibits were an analogue model of an adaptive control system, by which a plant and its controller may be simulated using standard analogue computer techniques. A criterion of quality of control is chosen and experimental fluctuations are applied to the settings of the controller. These fluctuations are cross correlated with a measure of control quality and the output of the correlator is used to change the controller settings in a direction which improves control quality. This process continues until the plant is operating at optimum quality.

Rank Cintel Ltd. showed a variety of electronic measuring instruments redesigned and fitted with transistors, which included a transistor wide range capacitance bridge possessing the added advantages over earlier valve models of greater scale length, improved reliability, simpler and quicker operation, mains or battery operation, no warm-up period and greater accuracy.

The 1-Mc/s universal counter timer with print-out unit is an instrument from the new range of 'Cintel' transistorised equipment for time and frequency measurement. Fully transistorised throughout, it uses printed circuit techniques to give an extremely light and portable equipment with low power consumption. A fibreglass case is used. Basically it comprises a counting chain consisting of a 1-Mc/s crystal oscillator, gate and six decades in cascade and a timing chain consisting of a 10-kc/s crystal oscillator and five decade dividers. Results of a measurement are presented in decimal notation on six panel mounted meters, each scaled from 0 to 9.

A complete range of printed circuit counter panels of uniform size, mechanical fixing and operating voltage have been made available by Rank Cintel Ltd., so that any specialised counting system can be easily constructed from standard units. The overall size of a typical panel is 9 in. by 5 in., the depth over components varying from ¾ in. to 1¼ in. All units are suitable for cascade operation.

Elliott Brothers (London) Ltd. showed their 803 computer which is a small fully transistorised machine fitted with a 4,096-magnetic core store. All kinds of input and output can be attached to it, including direct connections to instruments and displays. Models of this computer may be used for scientific, commercial and industrial applications including on-line process control.

Several forms of moisture monitor were exhibited suitable for the continuous measurement of moisture in gases and gaseous mixtures in the ranges 1-1,000 ppm. and 1-20,000 ppm. The 26-301 is a very small portable instrument which covers the range 1-1,000 ppm. in fine scales between 10 and 1,000 ppm. The response is approximately 63% in 30 seconds to a step change in moisture in either direction. The 26-310 is a process instrument covering the same dynamic moisture range, is explosion proof and suitable for continuous on-stream measurement. The control unit can be situated remotely from the analyser, for example in a plant control room. The process chromatograph shown on the stand has been designed for plant analysis of mixtures of most substances which are in the vapour phase below 65°C. Under nearly all conditions the katharometer detector is able to give a full scale reading for below ½% of any given component. In conjunction with a peak reader the instrument gives a continuous output suitable for automatic control. The 24-120 mass spectrometer leak detector is an advanced instrument capable of detecting and locating leaks as small as 5×10^{-11} atm. cu.cm. per second per division of helium in either pressurised or evacuated parts and systems. High sensitivity is coupled with low residual fluctuation and noise, and fast response and clean up time.

For control valves

The thermal drive actuator, a prototype seen on this stand, is designed for the operation of control valves, and deriving its thrust (500 lb) from a self-contained vapour pressure system, it operates directly from the controller output signal. Energy input is a constant heat source provided by a 500-W strip heater immersed in the fluid.

The Clean Air Act and general requirements for the atmosphere in factories have created the need for an apparatus which indicates without time lag the amount of dust carried in flue gases, air in workshops, in mines, etc. The Konitest dust meter fulfils this need in most cases. The principle on which it operates is based on the fact that when a dust particle rubs against a surface it will take a static charge, whilst the surface against which it rubs will take an equal but opposite charge.

Among a number of exhibits, Solus-Schall Ltd. showed a Dekatron gated counter scaling unit, designed primarily for use with diffractometers and ratemeter/amplifiers so that the number of individual counts arriving in a predetermined time may be recorded, or, more conveniently, the time is recorded for a certain number of counts.

There was also included an inching device for the angular degree per minute control of a diffractometer. The 'inching' intervals are for 1 to 10, 12 and 15 minutes of 'Bragg'

angle, with an alternative for continuous running. A new chart recorder now in production, with fast response milliammeter movements, using a continuous line ink pen on synchronous motor operated charts, can trace diffraction intensities obtained by counter techniques in conjunction with ratemeter/amplifiers.

The Research Department of Associated Electrical Industries (Manchester) Ltd. demonstrated the cathodic etching of metals—the erosion of the cathode in a glow discharge by positive-ion bombardment has been described as cathodic etching, since the cathode may show a structure after bombardment similar to that produced by conventional chemical etchants the magnetic gap tester—a new non-destructive testing device giving magnetically an approximate indication of the air-gap length between ¼-in. thick steel reinforcing bands used to strengthen a large steel pressure vessel and pneumatic gauging applied to the measurement of small bores of considerable axial length.

Force balance principle

In their Instrumentation Division, the Process Components Department showed linear and logarithmic instruments for area monitoring of gamma radiation and demonstrated three pneumatic transmitters with electrical output. All these latter work on the force balance principle and are completely transistorised. Output current in each case is proportional to measured pressure which can be between 0-100 mm. asbolute and 0-2,000 mm. absolute for the absolute pressure version, 0-250 lb. per sq. in. gauge up to 0-2,000 lb. per sq. in. gauge for the gauge pressure version and 0-25 in. w.g. up to 0-400 in. w.g. for the differential pressure instrument. Range adjustment facilities can be provided and the transmitters are intrinsically safe and flameproof.

On show for the first time was the A.E.I. 4-in. multipoint potentiometric recorder with pneumatic output, and the indicator/controller version of this instrument. The 4-in. recorder is transistorised and basically designed for thermocouple temperature measuring. Input ranges are 0 to 1 mV to 0 to 200 mV, range selection being by means of plug-in cards.

The Scientific Apparatus and X-Ray Department showed among other exhibits a thermocouple gauge, type VC8 (B) similar to the thermo-couple section of the combined Penning/thermocouple control unit but designed for operation from a 1.5-V battery; and a thermocouple gauge, type VC8 (M), similar to the VC8 (B) but suitable for operation from a 230-V a.c. supply.

Process and quality control by automatic chemical analysis is achieved by Baird & Tatlock (London) Ltd., in their range of Analmatic equipment. Analmatic autotitrators are designed for automatic monitoring of processes, checking product quality and plant efficiency, and examining the concentration of effluents, by repetitive titritmetric analysis of critical constituents.

The portable dissolved oxygen meter is a simple type of instrument based on the same principles as the wide bore polarograph, but is designed for measurements on samples in bottles, and incorporates a calibrated meter.

The automatic curve-plotting titrator can be used for any potentiometric titration, and records the 'titration curve' relating the electrode p.d. or *p*H to volume of titrant.

The Company's Research and Development Division exhibited three types of gas chromatograph.

The prototype I.P. 169 will analyse quantitatively petroleum gases containing hydrogen and hydrocarbons up to C_4, excluding acetylenes, but C_5 hydrocarbons in certain circumstances. A measured volume of sample gas is borne through a chromatographic column by a flow of carbon dioxide derived from a cylinder or a generator. The column is packed with granular absorbent of a known mesh size and components of the original sample are progressively separated as they pass through the column.

Although designed primarily for fuel gas analysis, the multi-detector gas chromatograph for fuel gases can be used for the analysis of many other gaseous mixtures. Separation of each component on the chromatograph is obtained by appropriate choice of each of the four column packings in conjunction with intelligent selection of the output from each of the detectors during the analysis..

The centrifugally decelerated chromatograph shown as a prototype has been developed in an endeavour to reduce diffusion due to time and development distance, the object being to produce chromatograms having spots of approximately the same size as the original spot applied. Diffusion is most marked at the end of the chromatogram from which the solvent flow starts. Centrifugal force is applied in a direction opposing the solvent flow along the paper. The resulting chromatograms, which measure 2 in. square, contain a clearly defined diffusion-free spot 1-2 mm. in diameter. Two-dimensional chromatograms can be produced by the same technique.

The repeated reading of a meniscus formed by liquid in a burette can be extremely laborious, so the results are prone to errors due to parallax and to optical differences between operators. The prototype mercury piston device shown offers a semi-automatic, motorised or manual arrangement for obtaining a direct digital read-out of meniscus displacement. No calibration of glassware is needed, and the volume changes of a nitrometer for instance, due to age have no effect. High precision is obtained and operator error drastically reduced. Readings can be taken faster and with less fatigue. Since the operator need no longer peer closely at the burette, the apparatus may be enclosed within a shield to prevent temperature changes caused by draughts.

Bulb manometer

The National Research Development Corporation showed a bulb manometer, of which the U-tube is provided with bulbs of substantially the same size at the top of the long leg as in the short leg. The effect of air infiltration is greatly reduced, and a possible full scale reading error of 10 mm. in a normal instrument can be reduced to ½ mm. in the new instrument. A narrow bore section in the lower loop prevents excessive movement of mercury when pressure is suddenly reduced.

In the frost point hygrometer, developed at Royal Aircraft Establishment, Farnborough, the air or gas under test is drawn across the surface of a mirror with the aid of a small pump. By a thermocouple arrangement of which the mirror forms part, the temperature at which frost formation occurs is accurately read. An optical viewer enables the instrument to be controlled manually, and it can be used for measuring the humidity of small samples of gas as well as of a continuous flow.

A camera rangefinder, from the Armoured Fighting Vehicles Research and Development Establishment, provides at the eye-pieces or windows, a visual indication of the depth of field of focus, for any setting of the focus and lens aperture opening. Comprising a rotatable diapositive, with two or more focus limit markings, a movable collimating lens and a means to view the focus limit markings stereoscopically through the eye-pieces, it has two controls, the first to vary the distance of the virtual image of the diapositive in space and, the second, to vary the apparent distance between the furthest and nearest of the markings on the diapositive.

Technical developments

Modifications to positive air blowers

RECENT modifications to the range of Type RBS Holmes-Connersville positive air blowers have resulted in a number of operating advantages, including improved performance. The impellers and shafts are now of fabricated construction in steel, making it possible to use much larger shafts and bearings which increase the allowable pressure loading on each size of machine. The maximum pressure for some sizes has been increased from 10 lb. to 15 lb. p.s.i.

These blowers are constructed with air gaps which completely isolate the bearing housings and gears from the casing. This ensures that under no circumstances, even in the event of an oil seal failure, is it possible for air passing through the blower to become contaminated with oil or oil vapours.

When handling gases other than air, type RBS blowers can be fitted with mechanical shaft seals which are considerably more efficient than the stuffing box and gland previously used. The mechanical shaft seal is much more compact and it requires little or no attention. A new publication fully describes the modifications made.—*W. C. Holmes and Co. Ltd.*

Boiler thermostats

THE range of Aquastat controls, the fast-acting boiler thermostats, has been extended by the addition of 18 new models. Among the additions are units intended to serve as complete control systems for domestic central heating installations, incorporating thermostats, switching relays, and transformers in a single unit.

The range of Aquastat controls has been designed to give the minimum of installation trouble. Where two or three or more boiler thermostats are needed, they can be contained in a single unit, needing only one boiler tapping. They can be mounted either vertically or horizontally.—*Honeywell Controls Ltd.*

Welding electrodes

TWO new additions to their range of arc-welding electrodes have recently been introduced by Lincoln Electric Co. Ltd. The first of these, NuFive, is a smooth flowing mild steel electrode of the cellulose type designed for the welding of mild steel in all positions using a.c. or d.c. It gives good penetration qualities and with its high melting rate and readily controlled slag, is particularly suitable for pipe welding, using either the conventional or 'stovepipe' techniques. The electrode, which conforms to the requirements of B.S. 639: 1952, is approved by Lloyds Register of Shipping and the Ministry of Transport for the welding of mild steel in all positions. The British Classification for NuFive is E.111 (B.S. 1719) the American Classification being E.6011 (A.W.S./A.S.T.M.).

The other new addition to the Lincoln Electrode range is NuSeven, an electrode of the iron powder-rutile type for general application to the welding of mild steel in all positions. A higher deposition efficiency compared with conventional titania (E.317) type electrodes with a faster deposition rate and less sticking of the electrode, are among the advantages offered by NuSeven, enabling up to 30% more weld per electrode to be obtained, thus giving more arc time and so reducing production costs. Good slag control renders positional welding easier and in many applications the slag is self-releasing.

NuSeven Electrode is approved by Lloyds Register of Shipping and the Ministry of Transport for the welding of mild steel in all positions. Its Classification under British Standard 1719 is E.917, the American Classification being E.6014 (A.W.S./A.S.T.M.).—*Lincoln Electric Co. Ltd.*

New earth borer

CHESHIRE Engineering Company have introduced a new rotary table-mounted Cheshire earth borer, suitable for use in conjunction with the short wheel base Ford Thames Trader 4 by 4 unit. With this new mounting, it is possible to obtain rapid spotting of the auger on piling construction, thereby minimising the vehicle movement.

A similar installation recently purchased by the G.P.O. is equipped with power hoist for erecting telegraph poles in addition to the new rotary table. This enables holes to be drilled and poles set along roadways without the necessity of shunting the carrying vehicle across the highway. —*Cheshire Engineering Co. Ltd.*

Level controller

A COMPACT conductivity-operated liquid level controller known as the Resistron, has been placed on the market. It has been designed as either a fixed sensitivity instrument, or fitted with a continuously variable sensitivity control and high/low change-over switch.

The Resistron is intended for use with any conducting liquid providing the specific resistance does not exceed 50,000 ohms per centimetre cube. It is ideal for the control of various types of acid and for controlling the level of water in feed tanks etc. In conjunction with a high temperature electrode it can be used for boiler level control and will give audible and visual alarm as well as taking corrective action when the water in an unattended boiler has fallen to a dangerous level.—*Thomas Industrial Automation Ltd.*

New range of loaders

THREE new additions have been made to the Muir-Hill range of hydraulic loaders. The FD2 Loader, which has front wheel drive, is ideal for down-hill loading and for working in loose material such as sand because of

its 'backing out' performance. The FD4, which has four wheel drive, can overcome much more adverse ground conditions and is arranged so that the drive to the rear wheels can be disconnected if required. The RD2, a versatile general purpose loader, completes the range.

All three machines are powered by a Fordson Power Major 3.6-litre 4-cylinder diesel engine which develops a maximum of 56 b.h.p. at 1,800 r.p.m. and a maximum torque of 171 lb./ft. (23.6 mkg.) at 1,200 r.p.m. A Borg and Beck 13-in. diameter dry plate clutch transmits power through a constant mesh gearbox providing six forward speeds of 2.1, 2.9, 3.7, 5.3, 7.4 and 13.3 m.p.h. and two reverse speeds of 2.7 and 5.0 m.p.h. Final drive is through a double-reduction driving axle with a four pinion differential and spur bull pinions and gears.

Powerful double-acting rams of 4¼-in. piston diameter operate the tip and reset of the bucket and provide more than 7,400 lbs. pry-out force to the 50° roll back bucket action. The main beam lift rams give a tearaway force of more than 6,200 lbs. when the bucket is fully rolled back.

Hydraulic power is provided by a heavy-duty gear-type pump driven through a Hardy-Spicer coupling from the engine crankshaft, high pressure fluid passing through a double selector controlled by twin-levers.

All three machines provide a height of lift under the lip of the tipped bucket of 11 ft. with 12 ft. 11 in. clearance under the bucket hinge. Maximum outreach is 5 ft. 10⅛ in.

The new Muir-Hill FD2 loader working downhill.

for the RD2 model and 5 ft. 5¼ in. on the FD2 and FD4 models. Maximum lift height of the beams is controlled by a limiting device to prevent strain on the hydraulic system.

Manoeuvrability is another feature of the new range of loaders, the turning circle of the RD2, for example, being only 30 ft. Robust frame construction from all-welded rolled-steel channel section is common to all three machines together with grouped controls, excellent visibility and a high degree of driver comfort. Totally enclosed driver's cab and a cushioned bucket seat are fitted as standard.

A full range of general and special purpose buckets of from ¾ to 2 cu.yd., is available for use with the new range of loaders. Buckets are fitted with abrasion resistant blades and check plates. Extras available include power-assisted steering and hydraulic transmission incorporating torque convertor coupling and epicyclic gearbox instead of normal clutch and gearbox.—*E. Boydell and Co. Ltd.*

Trade Publications

THE Cambridge Instrument Co. Ltd., have issued their List 309/1 which describes a sensitive, robust, industrial gas analyser of the thermal conductivity type for hydrogen-cooled alternators; it is designed to measure hydrogen in air, hydrogen in carbon dioxide, and air in carbon dioxide.

This Company has also prepared List 176 describing a range of thermometer regulators which are immediately available from stock.—*Cambridge Instrument Co. Ltd.*

* * *

A recently published booklet from the Stanton Ironworks describes the products of this company and the processes which are employed in their manufacture. Not only is manufacture described, but also the human element of the company as seen in its training schemes.—*The Stanton Ironworks Co. Ltd.*

* * *

The revised 'Maintenance Welding Data Book' contains articles on the history, development and correct application of the complete range of over 150 Eutectic low temperature welding alloys and fluxes, and gives full technical data on each one.—*Eutectic Welding Alloys Co. Ltd.*

* * *

A booklet prepared by the Davenport Engineering Co. Ltd., entitled '50 years' Endeavour in the Service of Industry,' traces the history of the company in the water cooling field.—*The Davenport Engineering Co. Ltd.*

* * *

'The Franki Systems of Piling' is the name of a booklet which explains the use of various types of pile for different circumstances. Driven, bored, Miga, composite, augered, light tube, and large diameter bored piles are all described in this booklet, and their individual uses set out.—*Frankipile Ltd.*

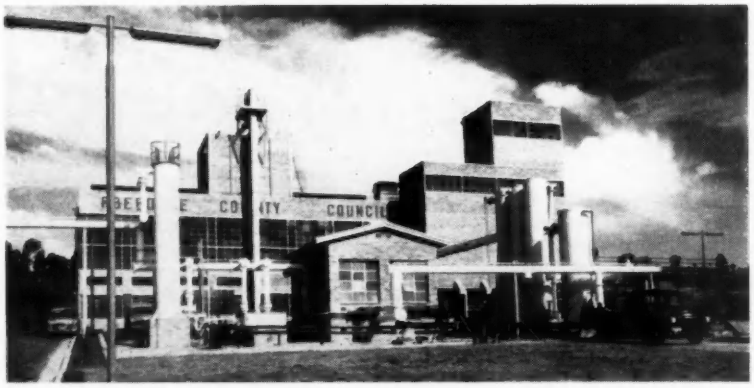
* * *

'Visco Water Coolers' gives a brief description of the various types of evaporative coolers in current use and contains illustrations of typical plants which this company has supplied in recent years. Also included are information of weather conditions in various countries, and tables giving performance figures.—*The Visco Engineering Co., Ltd.*

* * *

An item under the heading of Trade Publications, which appeared on page 494 of the issue of December 14, referred to Argus products, and to the firm of George Argus and Co. Ltd. This should of course have read Angus, the firm being George Angus and Co. Ltd.

A general view from the rear of the office block at Cessnock gasworks, N.S.W.—exhauster room, front centre.



CESSNOCK

—a new works 'down under'

★

AN event of major interest to the gas industry took place 'down under,' when the Treasurer and Deputy Premier of New South Wales, the Hon. J. B. Renshaw, officially opened the new Cessnock gasworks of the Aberdare County Council—the first complete new gasworks erected in New South Wales since 1913.

Cessnock, which is a town of 14,500 inhabitants, is in the centre of the rich northern coalfields of New South Wales, which supplies the best gasmaking coal in the world—and is also noted for the Hunter Valley wines which come from the district. It is situated 18 miles from Maitland, and 38 miles from Newcastle.

Aberdare County District, which was established in August, 1959, is the first County District solely concerned with gas supply, and embraces the areas of the city of Greater Cessnock, the shire of Lake Macquarie and the city of Maitland, together totalling approximately 1,200 square miles.

FLOOD-FREE

When the County District was proclaimed, gas was only available in certain areas of the Lake Macquarie shire from the City of Newcastle Gas and Coke Co. Ltd., and in part of the Maitland area from works conducted by the Maitland Gas Light Co. Ltd., and the Maitland City Council, whose plants were approximately two miles apart.

Both the Maitland plants were in need of major rehabilitation, and had been frequently closed by floods in the past. When the Coalfields Development Committee recommended the introduction of a gas supply in the Cessnock-Kurri Kurri district with the aim of promoting the growth of secondary industries, it was decided to call tenders for a plant at Cessnock which would be at the source of its coal requirements, and which could serve the Maitland area from a flood free site.

Tenders were called for a plant having a nominal capacity of 500,000 cu.ft. per day, which would be sufficient to supply Maitland's maximum daily demand, and allow for future growth in new areas. Tenders were also called for the installation of approximately 20 miles of high pressure trunk main to connect the distribution systems at Maitland with the works, and also to the town of Cessnock, which was two miles away.

Mainly for economic reasons, but also so that any of the coal available in the area could be utilised, it was decided to instal horizontal carbonising plant, and the successful contractors were Norman J. Hurll and Co. (Vic) Pty. Ltd., for the complete gasworks, and Unijon Ltd., for the trunk mains.

A total area of 15 acres was reserved for the gas project at Cessnock, and of this, an area of approximately four acres was chosen for the immediate needs.

The retort house is of steel-framed brick construction, amply glazed, and of particularly pleasing appearance. Four benches of eight machine-charged retorts 16 ft. 6 in. long have been installed, with space for two more benches, and plant capacity is estimated at 625,000 cu. ft. per day, using coal with 42% volatiles. Charging and discharging is carried out by a Jenkins De Brouwer machine, and the house has provision for storage of 90 tons of coal and 90 tons of coke.

Coal is elevated by a bucket conveyor, and coke by a skip hoist to Jenkins vibrating and grading screening plant. An ash skip hoist from the producer level to a 10-ton overhead bunker has also been installed.

Two Waller exhausters, fitted with multi-speed electric drives, and each capable of handling 25,000 cu.ft. per hour, draw the gas through annular and water tube condensers. They are installed in a separate building, capable of accommodating three units.

PURIFICATION

Purification is by means of Livesey washer, ammonia scrubber, and four 16 ft. by 16 ft. by 6 ft. oxide purifiers.

The gas is metered by a Holmes Connersville, size 8 in. by 24 in. station meter, and low pressure gas is stored in a 290,000 cu.ft., double-lift column-guided, welded holder, built by J. F. Thomson and Company.

All gas is compressed for distribution by three Consolidated Pneumatic 6564 compressors each driven by a 50-h.p. electric motor, and fitted with full automatic control, for operation at pressures up to 55 p.s.i. A high pressure cylinder, of capacity 11,000 cu.ft. at 55 p.s.i. has been installed at the works, and three other similar cylinders will be installed in the district of supply.

Full instrumentation has been provided

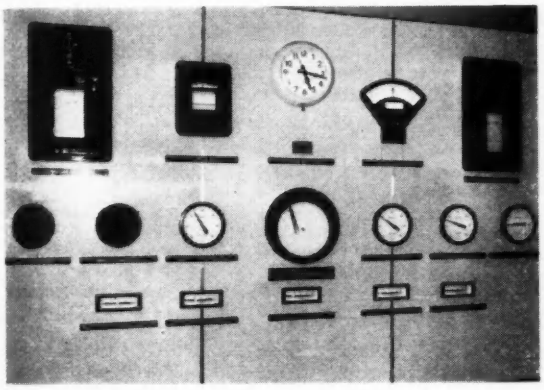
for operation of the plant by means of Sigma recorders, Cambridge CO_2 indicating recorder and Cambridge pressure and temperature indicators. The station meter reading is repeated on the instrument panel fitted in the retort house, by means of an electric telemeter.

To ensure continuity of supply at all times, and since electricity is utilised for driving all equipment, a stand-by diesel generating set has been installed.

The works area has been laid out with sealed roads, coke storage, and oxide areas, lawns and gardens, and apart from retort house, exhauster room and compressor-meter room, a garage block, administrative and store block, and residence have been provided.

Work began on the site on January 27, 1959, and the plant started gasmaking on May 11, 1960, an effort for which the contractors are to be commended. The contract price for the works was £318,190, but due to provision of extras to the original contract, and escalation charges caused by marginal wage rises, the final cost is expected to be approximately £355,000.

The 290,000 cu.ft. gasholder on the site.



The instrument panel at the new Cessnock gasworks, New South Wales.

All trunk mains are of mild steel, either solid drawn (4 in. and 6 in. diameter) or longitudinally welded (8 in. diameter), and have been coated with horizontal retort tar and laid in a sand bed with a minimum of 3 in. of sand on all sides.

Approximately eight miles of 8-in. diameter main has been laid from Cessnock to Kurri Kurri, from which point eight miles of 6-in diameter and two miles of 4-in. diameter feed West and East Maitland. The connection from the works to the town of Cessnock is approximately two miles of 4-in. pipe. From the Kurri junction, a further trunk main of 8-in, 6-in. and 4-in. diameter, approximately 20 miles long is to be laid to serve the Toronto area of the Lake Macquarie shire, and adjacent towns.

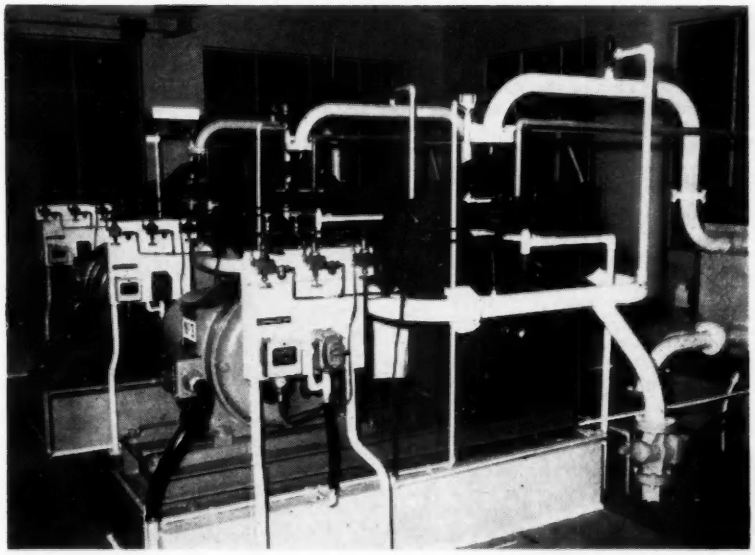
All new services will be by high pressure distribution mains and services, with Jeavons governors, while the supply to the existing Maitland areas will be controlled by Jeavons volumetric governors, feeding to the existing low pressure holders in those areas.

The estimated total cost for the construction of the works, and trunk mains, and the provision of 2,000 new services within the first five years of operation is £850,000, which allows for the purchase of the Maitland Gas Light Company's works. There are approximately 4,500 consumers already connected in the Maitland area.

The decision to erect the works, and make a supply available in new areas, was only made after much discussion and deliberation by constituent councils, and other interested bodies, and it remains to be seen whether or not the decision was right. But the potential is there, the coal is there, and the Cessnock gasworks could easily be the basis of an undertaking supplying gas to a much wider area than the County Council now covers.

At least it is an indication that the gas industry is far from being backward in New South Wales.

Below: Inside the compressor room—three Consolidated Pneumatic compressors with automatic control.



NEWS SUPPLEMENT

SALES AND SERVICE CONFERENCE

THE seventh Sales and Service Conference, organised by the Gas Council, will be held at Harrogate on Tuesday, Wednesday and Thursday, November 7, 8, and 9. Full details of the conference programme will be published in the near future, but on this occasion there will be no exhibition of appliances.

Enquiries about the conference should be addressed to the Conference Organiser, Mr. R. J. Gregg, Publicity Manager, the Gas Council.

Hire purchase controls are now relaxed

THE Board of Trade has announced that the maximum period for the payment of the balance due under hire-purchase and credit sale agreements now becomes three years in the cases of all those goods for which a two-year period was previously specified. The rates of deposit remain unchanged.

The goods affected include cars, light vans and motor-cycles, radio and television sets, refrigerators, washing machines and furniture.

The Board says that in making this change, which has been under consideration for some time, the Government has had regard to the position in the particular industries affected by the hire purchase controls. In view of the levels of activity in those industries, the Government feels able to make this change without detriment to the general policy of credit restriction.

RENTALS

A provision that no rental is to be less than 25 per cent of the highest rental is aimed at those agreements which, by providing for purely nominal hiring charges in the later years of a long agreement, enable the hirer to have many of the benefits of a hire-purchase agreement while escaping the control of the Hire-Purchase Order.

A requirement that payment equal to the advance rental shall be paid where a person is in possession of scheduled goods for 14 days or more is designed to prevent evasion of the advance rental requirements by the offer of unduly long 'free trial' periods.

GOODS AFFECTED

Among the goods affected are: Space heating installations and appliances of a kind designed exclusively or mainly for domestic use; the following appliances and apparatus, whether mechanically operated or not, being appliances or apparatus of a kind designed exclusively or mainly for domestic use, drying cabinets and drying machines, washing machines and washers excluding washing machines and washers which are designed for heating water by electricity or gas but which are not otherwise designed for operation by electricity or gas, and refrigerators having a storage capacity not exceeding 12 cu.ft.

Council demands fuel choice

FREEDOM of choice for householders to decide between electricity and gas has been demanded by the North Eastern Gas Consultative Council. The meeting of the Council which made the decision was held in Leeds and unanimously adopted a Hull resolution expressing concern at the extent of the development of all-electric multi-storey flats.

£10,000-PLUS FOR TOP MEN, HE SAYS

IF they were to attract the right men to run them the nationalised industries would have to pay salaries of more than £10,000 a year, said the Parliamentary Secretary to the Ministry of Power, Mr. J. George, speaking in Leicester.

The Times correspondent reports that Mr. George said it was impossible to get the right men because they did not regard £10,000 a year as sufficient. They could get much higher salaries in private enterprise.

He criticised the view that £10,000 a year was enough or too much for any man.

'Whether the country is shocked or not, higher salaries will have to be paid to get top men to make nationalised industries run efficiently', he said.

A cook in clover . . .

This is a still from one of three new colour films which have been added recently to the Gas Council's film library. The film is 'Cooks in clover' and here a North Eastern Gas Board Home Service Adviser is demonstrating the simplicity of traditional spit roasting, using a modern gas cooker in place of the old-fashioned fire. The other films are: 'Heat of the matter' and 'Travelling showroom.'

The spore-sampling machine designed by the New Zealand D.S.I.R., showing the Parkinson Cowan Zephyr domestic gas meter mounted above the wheels.

SPORES —AND EFFECT

A PARKINSON COWAN Zephyr domestic gas meter is successfully performing an unusual duty in New Zealand as part of the equipment designed by the N.Z. Department of Scientific and Industrial Research, Plant Diseases Division, to sample the density of disease-bearing spores on sheep grazing land.

Sheep catch the disease (facial eczema) by coming into contact with a spore-propagated fungus, *sporidesmium bakeri*. Before the spread of this dangerous fungus can be prevented effectively, it is first necessary to estimate the density of spore population in any given area.

The machine which has now been designed to perform the sampling operation is basically a volumetric spore trap.

Sliding-vane pump

As the machine is pushed across a field a sliding-vane pump, chain-driven from the wheels, sucks air containing the spores through an impactor tube and on to a prepared microscope slide.

Suction for this operation is derived from a sliding vane pump belt-driven from the wheels.

In order to assess accurately the number of spores in the pasture traversed by the machine it is essential that the volume of air passing through the system is recorded and maintained in a state of minimum turbulence.

The Parkinson Cowan Zephyr, installed in the air line between the impactor and pump, performs both of these functions efficiently.

As a result of using the machine it has been found that 2 cu.ft. of air (corresponding to a distance of 250 yards) is enough to produce an adequate selection of spores on the microscope slide.

'Major change' proposals in technical education

A MAJOR re-organisation of the system of courses for technicians, craftsmen and operatives in technical colleges is proposed by Sir David Eccles, Minister of Education, in a White Paper called 'Better Opportunities in Technical Education.'

In a circular to local education authorities and colleges, the Minister asks them to give early consideration to the proposals which call for action on their part and to co-operate to the fullest possible extent with the City and Guilds, Joint Committees for National Certificates, and other bodies which will be concerned with the preparation of the new courses and the revision of old ones.

BETTER LINKS

Two of the chief objects of the White Paper are to forge better links between schools and technical colleges, and to provide a 'technician's charter.'

'Since the White Paper of 1956 we have forged ahead in the training of scientists and technologists' said Sir David. 'The increase in the number of students taking sandwich courses leading to high qualifications has been highly satisfactory. But somehow we have not been so successful with the technicians, the craftsmen and the operatives. Now technologists and scientists need to be supported by these sub-professional grades. In particular it is high time the technician came into his own educationally. The White Paper writes, as it were, a charter for technicians, and also looks forward to great improvements in the opportunities for craftsmen and operatives.

WASTAGE

'An important defect in the present system is the high rate of wastage due to students failing to complete their courses' continued the Minister. 'This wastage is chiefly due to faulty selection of students for courses that don't suit them, to insufficient preparation before the course is begun, and to lack of enough time for study. This is one of the problems we intend to tackle.

'It does not do to train a boy too narrowly to one particular job or skill. The courses in technical colleges must be made broader—with more mathematics, more scientific principles and more English.'

Flame lecture

For over two hours in the Heriot-Watt College, Edinburgh, 250 senior secondary schoolchildren watched Dr. F. J. Eaton, Deputy Manager of the Gas Council Research Centre at Watson House, London, carry out upwards of 30 experiments during a lecture entitled 'Harnessing the Flame'.

ON THE FACE OF IT . . .

EQUIPMENT which will enable gas and electricity meters to be read by remote control is now being developed by scientists, says Peter Fairley, writing in the London *Evening Standard* feature 'The World of Science.'

How is this done? The dials on a meter are electrified and wired up to the nearest telephone line. Special signals sent down the line 'search' the faces of the dials. Signals received back show the position of the hands.

Trials are under way in the United States.

GEORGE WILSON METERS RECOVER

THERE was a group profit of approximately £14,000 in the half-year to September 30, 1960, according to an interim report from George Wilson Gas Meters Ltd. There was an approximate loss of £4,500 for the corresponding six months of 1959.

In the financial year ended March 31, 1960, there was a group profit of £5,146, after crediting £5,083 from stock reserve and charging £6,921 for special costs of investigation.

Substantial savings

Mr. W. D. Wilson, the Chairman, says that the transformation is attributable in part to an increase in the selling prices of meters, but the main factors are substantial savings in factory and administrative overheads brought about through the reorganisation of the manufacturing arrangements of both the parent company and its subsidiary, Radiant-Heating Ltd.

In arriving at the group profit, a provision has been made for certain costs of such reorganisation, which is still in progress and the benefits from which should be fully reflected in the accounts for the year 1961-62.

APPRECIATIONS OF—

Cyril H. Pearson

A memorial service for the late Cyril H. Pearson, who died on December 31, 1960, will be held at St. Michael's Church, Chester Square, London, S.W.1, on Wednesday, February 8, at 11.00 a.m.

Mr. H. P. Barker, Chairman of Parkinson Cowan Ltd., writes:

His countless friends in the gas industry were shocked and grieved at the news of Cyril Pearson's death. It was not only grief which was felt by all at the passing of an old and excellent friend, but also the shock of associating illness and death with a man whose robust vitality and enthusiasm dominated his character.

Cyril Pearson was educated at Manchester Grammar School and at Whitgift and served an engineering apprenticeship with J. & F. Howard, agricultural engineers, of Bedford. After a short spell in private business, he joined the Electrolux Company, and his experience with that Company afforded him his first major commercial insight.

He joined Parkinson Cowan in 1937 on the invitation of Colonel Harold Woodall, and from then until the end of the war he exercised a strong influence on the Company's commercial policy, and during the war carried a major responsibility for the Company's activities. After the war he joined the Board of the Parent Company and was appointed general manager of the Company's Gas Meter Division. The industry knows that Mr. Pearson achieved a major success in this appointment.

In 1955 he suffered a severe stroke. This would have broken the courage of most men, but after a remarkably short period he restarted work on a full time basis and concentrated his efforts on export sales promotion, and in encouraging the commercial activities of the whole Company. He was hard at work to within a week of his death.

Cyril Pearson's character is difficult to summarise even by those who knew him best. In his business life he was loyal, enthusiastic, and hard working. He hid a shrewd business judgment beneath a cheerful and ebullient manner. In his personal life he was a warm-hearted and generous man who loved his family, and who lavished a true affection on his friends. He was sincere in his friendships, and would promote the interest of others to an almost quixotic degree. He was a man of simple but steadfast beliefs, and his enthusiasm and loyalty for the gas industry were boundless.

His family, his colleagues and innumerable friends will mourn him and feel a sense of chill and loss at his passing.

★

F.J.B. writes:

Much will be written of the passing of one of the industry's greatest personalities.

Cyril, known everywhere among executives of the industry, did not confine his personality and kindly affection to those with whom he and his Company might harmoniously co-operate.

He helped, encouraged and shared the pleasures of workman and office junior and all who had the honour to serve under this dynamic man at one time or another will feel very deeply the passing of a friend.

Raiders take safe

RAIDERS carried away a safe 3 ft. high and weighing 5 cwt. from the Scottish Gas Board offices in Kinross after smashing a window on the main street. They broke the safe open in a wood about two miles from the town—and found inside only £18 in notes and silver.

FORTHCOMING EVENTS

February 2. — MANCHESTER DISTRICT JUNIORS: Visit to No. 3 Plant, A. C. Delco Division of General Motors Ltd., Moorgate Road, Kirkby, near Liverpool. Short papers for F. Johnston prize. 2 p.m.

February 3.—I.G.E., MIDLAND SECTION: College of Technology, Gosta Green, Birmingham. 'Development of Natural Gas in France and in the Sahara,' by Monsieur R. Odier. 2.30 p.m.

February 3.—LONDON AND SOUTHERN JUNIORS: 'The Preparation and Assessment of Technical Data,' by F. E. Craddock and A. E. F. Lane.

February 4.—YORKSHIRE JUNIORS: Sheffield. 'Sales and Service,' by G. Davies.

February 4. — EAST OF SCOTLAND JUNIORS: Kirkcaldy. Paper by A. McPherson.

February 7.—MIDLAND JUNIORS: Staff Mess Room, West Midlands Gas Board, Council House, Birmingham. 'Experience in America,' by Woodall Duckham Award winner.

February 8.—WALES AND MONMOUTHSHIRE JUNIORS, NORTH WALES SECTION: Rhyl. 'Management and Administration for Sales Results,' by A. Facer.

PERSONAL NOTES

MR. D. T. BARRITT has been appointed Deputy Chairman of Simon Engineering Ltd. Mr. Barritt has also been appointed a Director of Henry Simon (Holdings) Ltd, and will take up his appointment as Chairman of the Company on March 1. He will relinquish his executive responsibilities and his post as joint managing director of Simon-Carves Ltd. on the same date, but will remain a Director of Simon-Carves Ltd. Owing to ill health, MR. I. HEY will relinquish the chairmanship of Henry Simon (Holdings) Ltd. on March 1, but will remain a Director of the Company. MR. L. BROOK has been appointed a Director of Simon-Carves Ltd., and a member of the Management Board. MR. A. H. BENNETT has been appointed a Director of Henry Simon (Engineering Works) Ltd., and MR. J. G. MACLEAN has been appointed a Director of Turbine Gears Ltd.

MR. W. H. SHARLAND, Deputy Chairman of Powell Duffryn has joined the Board of Gulf Radiators. MR. A. C. HAZEL, Managing Director of Hurseal has been appointed to the Board of Janitor Boilers. MR. K. M. D. JOHNS has joined the Group and been appointed to the Boards of Janitor Boilers, Hurseal and Gulf Radiators. MR. R. H. STEWART, Managing Director of Janitor Boilers has joined the Board of Hurseal. MR. R. TURNER, Managing Director of Powell Duffryn Technical Services and Deputy Chairman of Powell Duffryn Carbon Products has joined the Boards of Janitor Boilers and Gulf Radiators.

OBITUARY

MR. FREDERICK GERRARD PYPER, the chief engineer and production controller of the East Midlands Gas Board, has died at the age of 60. Mr. Pyper joined the Gas Light & Coke Company in 1925 as assistant engineer to Fulham, Beckton and Stratford Works. In 1939 he was appointed acting chief assistant engineer at Beckton. He joined the Sheffield and District Gas Company in 1940 as the chief assistant engineer, and was later appointed deputy engineer (Construction). When the gas industry was nationalised in 1940 he became the engineer to the Sheffield and Rotherham Division of the East Midlands Gas Board. He moved to Leicester in 1954 upon his appointment as chief engineer and four years later he became the chief engineer and production controller when gas distribution was functionalised.

As we go to press we learn with great regret of the death, after a long illness, of MR. A. MCDONALD, full-time member of the North Eastern Gas Board.

The death has occurred, at the age of 86, of MR. FRANK WEST, a director of W.G.I. Ltd., Manchester.